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Military Operations  
Theater Missile Defense (TMD) Integrating Concept

**Summary.** This pamphlet serves as the basis for developing doctrine, training, leader development, organizations, and materiel changes focused on soldiers (DTLOMS) for operations involving theater missile defense. It provides the framework to understand theater missile defense operations and the required capabilities for U.S. Army, Joint and allied/coalition forces.

**Applicability.** This concept applies to Army organizations that develop DTLOMS requirements and products.

**Suggested Improvements.** The proponent for this pamphlet is the Deputy Chief of Staff for Combat Developments. Send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to Commander, TRADOC, ATTN: ATCD-BP, 10 Whistler Lane, Fort Monroe, VA 23651-1046. Suggested improvements may also be submitted using DA Form 1045 [Army Ideas for Excellence Program (AIEP) Proposal.]

**Availability.** This pamphlet is available solely on the TRADOC Homepage at <http://www.tradoc.army.mil>.

Contents

	Paragraph	Page		Paragraph	Page
<b>Chapter 1</b>			<b>Chapter 3</b>		
<b>Introduction</b>			<b>Concept</b>		
Purpose .....	1-1	1	General summary .....	3-1	4
References .....	1-2	1	Description of the concept .....	3-2	5
Explanation of abbreviations and terms .....	1-3	1	Enduring functions .....	3-3	8
			Future Operational Capabilities (FOC) .....	3-4	12
<b>Chapter 2</b>			<b>Chapter 4</b>		
<b>Overview</b>			<b>Implications</b>		
Why the concept is needed .....	2-1	2	Doctrine .....	4-1	14
Threat .....	2-2	2	Training .....	4-2	14
Capstone warfighting context-support of the Army XXI Operations Concept .....	2-3	2	Leader development .....	4-3	15
Joint concepts .....	2-4	4	Organizations .....	4-4	15
Other warfighting concepts .....	2-5	4	Materiel .....	4-5	15
Limitations .....	2-6	4	Soldier support issues .....	4-6	16
			<b>Appendix A</b>		
			References .....		16
			<b>Glossary</b> .....		17

Chapter 1  
Introduction

**1-1. Purpose.** This concept describes how Army XXI will conduct theater missile defense (TMD) operations. Army XXI is the Army's published plan to harness the change and advances of the 1990's and enter the 21st century with the most capable land combat force in the world.

**1-2. References.** References are listed in appendix A.

**1-3. Explanation of abbreviations and terms.**

a. Theater missile defense is protecting friendly forces, critical assets and vital or geopolitical areas from theater missile (TM) attack. It involves the employment of theater forces, supported by national capabilities, to detect, locate, identify, track, minimize or destroy theater missiles or theater missile capability. Theater missiles are those tactical ballistic missiles (TBM), cruise missiles (CMs) and tactical air-to-surface missiles

(TASMs), as well as selected support and analogous threat platforms, whose targets are within a given theater of operations. The TM threat includes TMs on the ground and in-flight; ground-based TM launchers; ships and vessels in port and at sea capable of launching TMs; enemy aircraft, on the ground or in the air, armed with TMs; the supporting infrastructure; and the operational and tactical command, control, communications and computers, intelligence, surveillance and reconnaissance (C4ISR) assets.

b. TMD is composed of four operational elements: attack operations, active defense, passive defense, and battle management/command, control, communications, computers and intelligence (BM/C4I).

(1) Attack operations destroy, disrupt, or neutralize an enemy's capability to launch TMs by targeting TM systems and their supporting infrastructure, including launch platforms, command and control (C2) nodes, factories, storage and distribution facilities, logistics support facilities, and ground based C4ISR.

(2) Active defense operations protect friendly forces and assets from TM attack by destroying in-flight TMs, TM airborne launch platforms and supporting airborne intelligence, surveillance and reconnaissance (ISR) systems.

(3) Passive defense operations and measures reduce vulnerability and minimize TM effects, to include those from weapons of mass destruction (WMD). This requires Army and joint force capability to provide complete situational awareness to reduce force vulnerability and mitigate the effects of TM attacks on operating tempo (OPTEMPO) and sustainability operations. Improved survival enables the force to rapidly restore operations and reconstitute after a TM attack. The net result is reduced degradation should an attack occur. An adversary's knowledge of our force's survivability may even reduce the likelihood of attack.

(4) BM/C4I nodes plan, monitor, direct, coordinate and integrate the Army and/or joint force capabilities required to conduct and link passive defense, active defense and attack operations. C4I refers to common systems in use or under development for communications and battlespace command and control, as well as to organic weapon systems' command, control, communications and computers (C4), (such as embedded in air defense missile systems) or stand-alone weapons' control systems such as Army Field Artillery Tactical Data System (AFATDS). Battle management refers to the real time decisions and use of these C4I systems by commanders and tactical officers. (See the glossary for a full definition.)

c. Other terms and abbreviations used in this concept are explained in the glossary.

## Chapter 2 Overview

**2-1. Why the concept is needed.** In support of Army XXI, this concept is needed to focus Army TMD operations as we implement required changes in doctrine, training, leader development, organization, materiel and soldiers (DTLOMS). The Army must improve its TMD capabilities to effectively counter developing and future TM threats. Most of today's TMD systems and organizations do not fully possess essential Army XXI characteristics (strategic mobility, appropriate doctrine, modularity and tailorability, joint and multinational connectivity, versatility, and digitization as required by other Army concepts) and cannot fully support Army XXI. Army XXI TMD requires fully integrated, highly mobile combat, combat support (CS) and combat service support (CSS) forces and BM/C4I elements in support of cohesive and coherent combat operations.

**2-2. Threat.** The operational environment is expected to include worldwide inland and littoral areas where hostile forces ranging from terrorist groups to large armies, will threaten U.S. and friendly forces, and other areas of vital interest. Hostile forces will employ a

variety of TM, ISR and other systems to accomplish their objectives. These threats are expected to proliferate because the support systems will be readily available on the arms markets, are relatively inexpensive, and the weapons are able to locate, identify and strike high value targets. TMs are particularly significant threats because they are capable of carrying WMD that can cause widespread damage and inflict mass casualties.

a. The threat to be countered includes the full scope of an adversary's national TM capability. Specific TM threats are:

(1) Tactical ballistic missiles are those systems whose transporter-erector-launchers (TEL) are small, easy to conceal and difficult to detect prior to launch. Once a missile is launched, the launcher can be quickly moved to a hide site to avoid targeting by our attack assets. Some missiles can be launched at varied elevation angles, resulting in depressed and lofted trajectories. The missiles can carry many types of warheads, which may employ technical countermeasures (maneuvers, stealth technology, jammers or decoys) to complicate intercept by our active defenses.

(2) Cruise missile systems. CMs can be ground, air or sea launched. Cruise missiles are difficult to detect and engage because of small radar cross sections, long stand-off range and their ability to fly a variety of flight profiles (low altitude, terrain following). Furthermore, they can approach their targets from virtually any direction, and in many cases, use terrain to mask their approach. CMs can carry the same types of ordnance as TBMs, potentially more effective payload dispersion and may have very accurate targeting capabilities.

(3) TASMs are air launched missiles designed to strike ground targets. Types vary according to mission but anti-radiation missiles (ARMs) represent the greatest threat to active defense. Once launched, TASMs can be difficult to detect because of their small radar cross sections. TASMs can employ a variety of guidance schemes and carry primarily high-explosive warheads.

b. Other TMD-related threats of concern include unmanned aerial vehicles (UAV), special operations forces (SOF), satellite ISR systems, manned aircraft and TM surrogate weapons such as large caliber artillery rockets. These systems pose a serious threat to friendly forces and critical assets within a theater of operations because of their ability to collect intelligence information or capability to strike TMD forces, either selectively or as part of their general battlefield mission. Threat ISR activities can provide near real-time information on the location, composition and activities of friendly forces and provide targeting information to the threat's long-range attack systems (artillery, TMs).

## 2-3. Capstone warfighting context—support of the Army XXI Operations Concept.

a. By leveraging information-age technologies, Army XXI TMD operations will focus support and capitalize on the visions set forth at the Joint, Service, Unified Command and major Army Command (MACOM) levels.

Specific linkages are:

(1) TMD operations must fully embody the characteristics of Joint Vision 2010's operational concepts of Dominant Maneuver, Precision Engagement and Full Dimension Protection.

(2) TMD is implemented within the Army's Vision 2010 patterns of operation of Project the Force, Protect the Force, Shape the Battlespace, Decisive Operations, Gain Information Dominance and Sustain the Force.

(3) TMD operations form part of U.S. Space Command's Vision of Global Engagement and Full Force Integration.

(4) TMD operations will utilize elements of the U.S. Army Space & Missile Defense Command Vision; sensor-to-shooter systems (see glossary), soldier systems, global multi-element TMD, precision targeting, global communications and situational understanding. These specific characteristics are those that Army forces must meet in order to contribute to gaining the Joint Vision goal of Full Spectrum Dominance.

b. Under the Army XXI Operations Concept, our force projection Army must rapidly mobilize and deploy from the continental United States (CONUS) or elsewhere, prepared to face the full spectrum of operational environments. Together with forces of other Services and nations, our Army must design organizations and develop capabilities that will allow it to be rapidly tailorable, rapidly expandable, strategically deployable, and effectively employable as part of a joint/multinational team to dominate any situation through simultaneous, multi-dimensional and continuous operations. This concept applies to the total Army force operating in a TM threat environment and provides for the integration of Army TMD into joint, multinational and interagency operations.

c. Army XXI characteristics of TMD operations. Like all Army XXI operations, the TMD battlespace is expanded in all four domains. Management of the electro-magnetic spectrum to facilitate sensor integration, BM/C4I integration, and information operations (IO) will increase. Passive defense links with host nation (HN) and non-governmental organizations (NGO) expands the human dimension from the previous military-only configurations. Management of the time dimension is more critical as elements of the TM target set must be identified and attacked before the threat to friendly forces can be mobilized.

(1) Integration is the fundamental Army XXI characteristic on which all TMD operations depend. Integration has implications both vertically (command and control) and in horizontally shared situational awareness (communications, computers, intelligence). All units and forces engaged in TMD operations must be able to receive TMD ISR data and share a relevant common view of the battlespace. The primary tool that allows integration is digitization. This is crucial for early entry operations, where forces conducting TMD are at

minimum capability and almost certainly multi-service. This capability must link joint forces, both in-theater and in CONUS, other agencies of the U.S. and coalition governments, during many stability and support operations, host nation forces and NGO's as well. Once full integration is achieved, TMD forces will be able to conduct distributed operations.

(2) Distributed operations recognize that TMD can be centrally planned to ensure that Army XXI and joint goals are attained, but decentrally executed at the unit level. Each function is executed by the unit, node or echelon best suited for the set of circumstances. Real time, global, on-the-move communications, including simulation links, allow collaborative tactical planning, testing and exercise of courses of action. Once distributed operations are fully realized, the force will be able to achieve simultaneity.

(3) Simultaneity is the characteristic of Army XXI that creates the opportunity to achieve the maximum synergy on the most critical parts of the enemy's TM forces, infrastructure or his political will to employ his weapons. The opponent is overwhelmed trying to react to multiple attacks and effects from a fully integrated, synchronized TMD operations plan that supports all phases of the commander in chief (CINC) campaign plan.

(4) Precision characteristics of TMD. To achieve precision, TMD elements must be correctly positioned in time and space, with the right munitions and with air and missile defenses to effectively counter each enemy TM capability. The ultimate force must be fully integrated, conduct distributed operations and widely generate and distribute fire control quality data to multiple dispersed shooters.

d. The goal of implementing a force with these characteristics is to operate in the multi-dimensional Army XXI battlespace. Because the Army XXI battlespace will also be non-linear, current control measures and tactical and C2 groupings may not apply. Electronic attacks may occur on US space or CONUS assets before political events allow commitment to the theater. Enemy TM attacks can be directed against nonmilitary targets to force units into non-tactical dispersal or scattered defenses, prior to attacking maneuver forces, support units and ports. Enemy attacks can be directed from nonmilitary, high population areas that require highly accurate and precise attack operations strikes to negate or destroy the threat.

e. TMD operations must be multi-dimensional to conduct: preemptive strikes, 360 degree protection of forces/assets, rapid reconfiguration of defenses, to maximize passive defenses; to ensure the configuration of a BM/C4I architecture to adequately support the TMD effort. TMD must support counter-proliferation measures against the TM threat, before and during operations as well as the full range of attack options in support of the CINC. Time sensitive targets (TST) must be quickly and accurately located and attacked to maintain OPTEMPO and shape the battlespace for each phase of the CINC's theater campaign.

**2-4. Joint concepts.** This concept provides guidance for Army forces and operations to support and synchronize with the Joint Chiefs of Staff (JCS) publication, Concept for Future Joint Operations.

a. Friendly force planning is conducted from multiple locations and echelons via globally integrated military and civilian sensors and communications.

b. Attacks are conducted using multiple sensors feeding a common situational view of the battlespace. Weapons receive selected targeting data from a theater database containing the total sum of information available for the tactical situation. Targets that can be better countered by joint assets will be nominated to joint headquarters for attack.

c. Appropriate weapons' effects are concentrated, vice the traditional massing of forces, on selected areas, units and installations. Minimum force, very accurate attacks on TM's, launch platforms, TST's and other high value TM system targets will conserve logistics in the smaller future force, inflict command, control and communications (C3) damage to slow the enemy's decision cycle, and allow allocation of forces and sorties against a larger target set. Precision allows forces and fires to be tailored to the mission or strike and is critical for attack operations and active defense.

d. Army XXI TMD operations will also support the joint functional concepts and desired operational capabilities (DOC) underlying the current Joint Publication (JP) 3-01 (Draft), Countering Air and Missile Threats; JP 3-01.5, Doctrine for Joint Theater Missile Defense (JTMD); JP 3-03, Doctrine for Joint Interdiction Operations; JP 3-09, Doctrine for Joint Fire Support; JP 3-11, Joint Doctrine for Nuclear, Biological Chemical Defense; JP 3-13, Joint Doctrine for Information Operations.

**2-5. Other warfighting concepts.** Army forces conducting TMD operations will implement Army concepts supporting the patterns of operation found in Army Vision (AV) 2010.

a. Modularity. Force projection and deployment are enhanced through improved strategic and operational mobility of systems and organizations that participate in TMD. This is achieved through improvements in tailorability and modularity (TRADOC Pamphlet (TP) 525-68). TMD elements will deploy in functional increments directly into combat operations tailored to the joint force that enable Army forces to interoperate with other Services, militaries and agencies.

b. Battlefield visualization and battle dynamic concepts. Battlefield visualization enhances force protection by providing a clearer vision of the threat; e.g. extended battlespace time and geometry increases situational awareness thus precluding surprise and mitigating TM effects. This is achieved by improved integration, data fusion and cueing of active defense systems, and better passive defense capabilities (early warning, greater survivability from WMD by enhanced nuclear, biological and chemical (NBC) surveillance,

detection, ID, monitoring and reconnaissance). The battle dynamic concept mandates improved coordination of attack operations fires and improved weapons system capabilities to increase friendly OPTEMPO. Together, these allow army commanders to synchronize with joint force operations to achieve maximize synergism and lethality of forces early in the campaign.

c. Deep and simultaneous operations and information operations. To support Shaping the Battlespace and Decisive Operations, forces will improve detection, location and identification of TM systems and associated infrastructure while denying friendly data via C2 protect and operations security (OPSEC). Distribution of targeting information to attack systems and attack system capabilities will be improved. More accurate munitions and precisely sized and structured combined arms forces will be used against critical objectives throughout the battlespace. Key to defeating adversary TMs and associated infrastructure is joint attack and counterfire operations with integrated information operations (e.g., command and control warfare (C2W)) against threat C4I systems.

d. Enhanced counter-air capability (ECAC). The overlap of their target sets (cruise missiles, large caliber artillery rockets) and common sensors will require and enable units and systems fielded for both TMD and ECAC to share an integrated air picture. ECAC and TMD units may provide limited reinforcing fires to each other.

e. Logistics concepts. Army forces must be structured to operate in accordance with (IAW) TP 525-77 and TP 525-53 and still be able to optimally accomplish TMD operations.

**2-6. Limitations.** The structure of the joint TMD force will be a possible limitation, due to constraints on types and numbers of units, either politically dictated, imposed by time phased force deployment list (TPFDL) phasing or changes, or unit operational unavailability.

## Chapter 3 Concept

### 3-1. General summary.

a. TMD operations and actions may be required as part of any military operation. Missions possibly requiring TMD-capable forces can be defending or liberating territory, strikes and raids, conflict containment, leverage, and core security. In all cases, the initial focus of TMD is toward proactive actions that aid in shaping the battlespace. If not completely successful, joint TMD will focus on eliminating the deployed threat as early as possible while ensuring the force can achieve and maintain freedom to maneuver despite TM attacks with minimal impact on operational tempo. Army TMD capable forces may be deployed rapidly and early into the theater of operations to:

(1) Provide a tailored BM/C4I element that focuses on TMD in support of US Army forces (ARFOR)

commander or a service or functional component commander. This element will perform critical TMD planning activities to prepare Army forces for entry and operations in the joint theater and do the tasks required to effectively orchestrate all available assets into TMD operations. This next generation of Army-wide C4I systems must provide a robust, integrated BM/C4I capability that provides the integrated architecture, communications, automated facilities, intelligence and targeting information. (All further discussions of the BM/C4I operational element presume common C4I architecture). It must be interoperable with the other services.

(2) Destroy threat airborne and ground ISR systems that target friendly forces.

(3) Neutralize threat TMs with deep and simultaneous attacks on TM forces and infrastructure.

(4) Conduct active defense versus TMs launched against friendly forces and geopolitical assets.

(5) Provide guidance to all Army forces on passive defense measures and ensure establishment of early warning networks.

b. During initial entry and follow-on deployment operations, land, sea, space and air forces may conduct attack operations, capitalizing on all opportunities to destroy TM systems and infrastructure throughout the life cycle of the threat. Emphasis will be placed on neutralizing or destroying the threat ISR capabilities to target and assess the effectiveness of TM strikes. Attack operations will be coordinated by an automated cell, and will be executed by units with direct sensor-to-shooter links for targeting information and monitored by higher headquarters. Active defense operations will engage and destroy incoming TMs at extended ranges. A complementary mix of Army, joint and combined forces and weapons systems will provide multi-tiered defense in depth via multiple engagements. Active defense forces will be sufficiently mobile to provide continuous protection of battlefield forces, critical assets, and selected geopolitical targets. All elements of the joint force will continuously employ passive defense measures throughout the operation. These measures will reduce the vulnerability of friendly forces, reduce enemy targeting effectiveness, and provide early warning to affected forces and population centers so soldiers and civilians can take appropriate protective measures well before TMs impact or NBC contamination spreads.

c. Underlying the TMD operational elements, the intelligence and targeting information will be provided by an integrated suite of multispectral, space-based, aerial and surface sensor systems and forces. These systems will be equipped with high-speed processors and communications equipment capable of processing and downlinking critical information in near real time directly to C3 facilities, weapon systems, soldiers and allied forces.

**3-2. Description of the concept.** TMD operations span the patterns of operation in AV 2010 and are conducted during all stages of the CINC's campaign for any mission.

a. Project the Force.

(1) Mobilization/predeployment. Mobilization/predeployment stages are initiated in response to a situation requiring military action. Most situations requiring military forces are expected to include a TM threat.

(a) Preparation for TMD operations will include the joint force commander's (JFC) designation of a JTMD proponent to focus on planning, coordinating, integrating and monitoring TMD. Whether managed by a service or functional component commander, missile defense coordination, preparation and training of early entry forces prior to movement into the theater of operations is crucial. Forces mobilize, task organize and conduct home station training. Enroute training and rehearsals will continue as intelligence is provided.

(b) When designated, the ARFOR commander (either a pure Army force or the Army service component of the joint force) normally uses TMD functional elements to plan, coordinate, monitor, and integrate TMD within his area of operation (AO). Automated planning cells with capabilities to develop a TMD annex, synchronized with the JFC's operations plans (OPLAN(s)), will conduct detailed planning and assessment activities that are required to prepare for entry and follow-on operations. These activities include:

- Conducting TMD Intelligence Preparation of the Battlespace (IPB)
- Planning and assessing the TMD design and operations.
- Developing TMD force packages for all stages of force projection operations
- Coordinating with the component commander operations centers
- Coordinating communication linkages
- Assessing passive defense collective and unit capabilities
- Recommending and coordinating TM attack warning procedures
- Assisting in development of theater deception plans
- Coordinating TMD aspects of joint targeting with JFC staff
- Planning for follow-on TMD elements and operations

(c) Accurate, timely, and fused all-source intelligence is essential to TMD operations. Information should include location of missile manufacturing, assembly and storage facilities; the types of TM systems in the enemy's inventory; performance characteristics and warhead types, (to include any WMD capabilities); the enemy order of battle, specifically the identity, location, composition and strength of units capable of launching TMs; details on TM C2, to include which political and military leaders have launch authority and how launch orders are communicated, enemy tactics to include the use of technical countermeasures; the location of marshaling areas; and known launch sites.

(d) Commanders involved in TMD operations will assess the enemy situation using automated force tools and expert systems to design TMD deployments, analyze and interpret the intelligence data and develop enemy courses of action (COA). They will postulate how enemy force activities will impact their operations and use wargame simulations to assess these situations. Commanders will also recommend updates to the TPFDL to ensure that their forces are tailored to the expected threat, entry, follow-on operations and the overall mission.

## (2) Deployment/entry.

(a) Deployment/entry operations will be characterized by rapid deployment of forces to the area of responsibility (AOR). Army TMD units will integrate with forces already in theater (e.g. Navy lower and upper tier systems providing littoral defense) to protect follow-on arriving forces, lodgment areas, ports and geopolitical assets, and if required, conduct preemptive strikes against threat TM assets.

(b) A tailored TMD task force may deploy early into the theater to link with joint, national and allied BM/C4I nodes on land, at sea, in the air and in space. It will establish an integrated common operational picture and share this picture with deploying forces. As required, it will perform TMD staff functions; monitor friendly and threat air operations; monitor air defense unit locations and status and recommend defense designs and TMD priorities in coordination with maneuver plans. It should, as a minimum, consist of some active defense systems, BM/C4I with joint interface capability, units with tactical missile attack capabilities and possibly attack helicopters. This force package configuration will also provide communications, intelligence, supply and maintenance capabilities. The TMD task force will protect the force and critical assets during early entry/initial lodgment. It will require reinforcement during subsequent phases of operation.

(c) Except for common service support, other initial/early entry passive defenses must be a unit responsibility until specialized support capabilities and units or joint task force (JTF) in-theater support functions or capabilities can be organized and integrated into the operation.

b. Protect the Force. In the TMD perspective, this is operational protection of the entire theater force, maneuver units, ports, host nation government and civil infrastructure. It requires the full integration of all four elements of TMD so that the theater commander can conserve and marshal forces to strike at the decisive times and places.

(1) Once in theater, monitoring of threat activities uses intelligence provided by available space-based, aerial and ground sensor platform systems, as well as deployed SOF teams. Signal intelligence (SIGINT), imagery intelligence (IMINT), human intelligence (HUMINT), measurement and signature intelligence (MASINT), technical intelligence (TECHINT) and weather information will be collectively used to:

- track threat movements.
- assess threat intentions.
- bolster passive defense measures.
- develop plans for conducting attack operations against vulnerable elements of the enemy TM infrastructure—including missile and warhead (particularly NBC) production, distribution and storage facilities, logistic support facilities, C4ISR and launchers.
- BM/C4I elements, both in and out of theater, must continuously process, review and reassess intelligence information. Vulnerability assessments will be made continuously, and C2W and countermeasures will be synchronized with attack operations to preclude the enemy from effectively targeting the force.

(2) Launch warnings (to include the predicted ground impact point and time (PGIP/T) and estimated launch point) will be transmitted directly to appropriate units. If sensors obtain tracking information on the TM, they will provide cueing information to joint information networks. This enables active defenses to engage the TM at extended ranges.

(3) Echelons above corps (EAC) active defense will normally deploy in a complementary mix of lower tier systems (Patriot for example) and upper tier, and will execute TBM engagements automatically under local C2 (decentralized mode). Upper tier units will engage TBMs at longer ranges and higher altitudes and automatically pass digital data to lower tier systems for subsequent engagement if required. Multiple engagements will provide near leak-proof defense over critical CINC assets. Some longer range TBMs may only be engageable by the upper tier, which may have to fire multiple shots to achieve required defense level. Shorter ranged TBMs may only be engageable by lower tier systems due to variable trajectories. This can result in less battle space and time to provide expected levels of protection, thus proper integration of early warning assets and systems is critical.

(4) While any active defense system should engage CMs/TASMs, they are usually lower tier/low-level short-ranged air defense (SHORAD) targets. Corps and divisions will retain assigned and organic active defense units to provide protection against short-range TBMs, CMs/TASMs and aerial C4ISR platforms.

(5) As friendly forces continue to arrive in theater, other Army TMD C2 nodes will become operational. This includes corps tactical operations centers (CTOC), deep operations coordination centers (DOCC), battlefield coordination detachments (BCD) and air and missile defense commands (AAMDC). DOCC/BCD normally assume attack operations planning, coordination and monitoring responsibilities for the corps area.

(6) Army attack assets capable of engaging TMD targets will include Army tactical missile systems, attack helicopters, SOF and/or allocated joint attack assets (such as US air force (USAF) aircraft sorties.) Assets are selected based on factors such as the target ranges with respect to assets, the asset's operational status, target types, the number and type of missions in progress, munitions available, the enemy air defense threat, available time and the accuracy of the targeting acquisition data. This target-weapon pairing process will be automated while maintaining the human in the loop. Specific trigger criteria will be determined from the wargaming process, and distributed to sensor and attack systems. Commanders continue to monitor the enemy and friendly situations, adjusting attack and intelligence collection plans as required, and may recommend direct sensor-to-shooter dissemination of targeting information to meet critical timelines associated with some TSTs (counterfire targets such as TELs).

(7) Passive defense measures. All units will continuously employ TM passive defense situational awareness means and exercise the full range of passive defense measures: tactical warning, reducing targeting effectiveness, reducing vulnerability, recovery and reconstitution. Theater support systems and facilities (e.g. medical, NBC defense, engineer, and host nation support) will be configured and emplaced to support unit passive defense measures.

#### c. Shaping the Battlespace, Decisive Operations, Gain Information Dominance.

(1) These operations are characterized by conducting TMD actions against the full range and intensity of the TM threat while simultaneously supporting maneuver unit operations throughout the battlespace. The focus of TMD activities will be to collect and disseminate critical intelligence information, develop follow-on targeting plans, integrate and coordinate with joint force capabilities to execute these plans, and protect critical assets and maneuver forces against ISR and TMs. Intelligence and supporting communication systems will provide commanders accurate, current air and ground situational awareness and the latest information on enemy TM activities. If deployed, SOF may collect information through the conduct of unconventional warfare and special reconnaissance.

(2) Units capable of conducting attack operations will deploy and orient on specific named and target areas of interest to facilitate fire support coordination. The ARFOR commander or joint force land component commander (JFLCC) exercises tactical control of these units, directs strike operations and requests tasking for intelligence elements to conduct battle damage assessment (BDA). If threat TMs pose an imminent threat, the JFC may direct attack operation's elements to proactively engage and destroy them. As possible, enemy TM C4I targets will be integrated into joint targeting processes such as information warfare, the counter-air campaign, and joint interdiction.

(3) BM nodes will continue to plan, coordinate, implement and monitor TMD operations and will recommend adjustments to TM defenses based on joint and Army requirements. They will:

- Perform critical force operations planning functions and recommend theater/joint attack operations and assets to best accomplish that mission.
- Continue to develop, modify and coordinate deep attack operations within the corps battlespace.
- Maintain close coordination with intelligence elements and joint coordination cells to ensure they are aware of all pertinent, available information.
- Monitor theater-level passive defense capability.
- Continue to communicate with joint, allied and Army BM/C4I systems and their subordinate units.
- Monitor the progress of the air breathing threat (ABT) and TM engagements.
- Disseminate air raid and TM warnings as required.
- Participate in the manned aircraft combat identification (ID) decision process.

(4) All deployed units implement passive defense measures to prepare for enemy ISR and TM attacks. The units update their NBC intelligence, implement deception, camouflage and concealment, hardening, and OPSEC measures, warning procedures, and conduct training to ensure that all soldiers are prepared for TM attack.

(5) NBC agents may be released as a result of a TM impact, aerial burst or intercept. Passive defense cooperative detection systems will detect agents at standoff ranges and disseminate this information to an expert analysis and warning system. The expert system will analyze the information, determine the agent (or agents) involved, predict areas at risk, and disseminate timely warning information directly to units at risk. Concurrently, NBC reconnaissance operations shall be directed, and medical treatment, logistical support and decontamination operations should be modified to

support recovery operations. Tailored situation awareness will give commanders relevant information to minimize degradation of operational tempo. NBC situational understanding allows forces to maintain positional advantage and reduce vulnerability against TM deployed WMD hazards.

d. Sustain the Force. TMD's primary contribution to sustainment is tied to the overall provision of force protection. The ability to transport and conduct logistic operations free from the TM threat is a major force enabler. However, the TMD force must also sustain their own integrated capabilities during combat operations by maneuver and full implementation of Army XXI logistics and maintenance initiatives. During the final stages of an operation, units may be shifted to other areas of operation, or returned to CONUS. These redeployments are periods of potentially high vulnerability.

(1) As forces are shifted there may be a residual TM threat to in-theater forces from isolated pockets of resistance. Army forces must maintain TMD operations to guard against this event. Intelligence must continue to locate hold out forces and identify likely attack avenues of approach. While consolidating units for redeployment, residual forces must be modular and capable of conducting TMD operations at a full readiness capability. Selected C2 nodes, sensors and intelligence systems will continue to be required to remain active in sufficient quantities to provide continuous (though reduced) early warning and intelligence coverage. Active defense units might be expected to remain in theater for a time after the cessation of hostilities. Additionally, specialized teams may remain behind to support TMD aspects of treaty verification after the main forces have departed.

(2) Commanders will prescribe the size, composition, and mission guidelines for forces continuing to support TMD operations. Depending on mission, enemy, terrain, troops, time and civilian (METT-TC) resources available these forces may reorganize in a manner similar to tailoring the initial-entry-operations TMD task force.

**3-3. Enduring functions.** The TMD concept for Army XXI operations supports various battlefield functions (intelligence, maneuver, firepower, protect, logistics, C3) as outlined below.

a. BM/C4I is an integrated fusion of intelligence, command and control, communications and computers. Robust BM/C4I capabilities are required to integrate TMD operational elements, and provide commanders the facilities, communications, automated decision aids and information they need to effectively plan and execute TMD operations. This capability will also enhance C2 in other areas, such as maneuver and logistics operations.

(1) C2. Commanders and staffs must have advanced tactical operations centers (TOC) with

automated battle management and planning capabilities that enables them to:

- Effectively plan and execute TMD operations.
- Tactically deploy and perform TMD C2 operations on-the-move as required by tactical situations.
- Share a relevant common operational and tactical picture of the battlefield, with common target numbering for air, ground and sea targets.
- Quickly reconfigure workstations and communication linkages to meet changing demands of the mission and situation.
- Maintain full battlefield situational awareness through information displayed in the TOCs.
- Develop and implement TMD rules of engagement for all operations.
- Provide fire control of distant units and weapon systems conducting active defense and attack operations.

(2) Communications. Communication capabilities required to support TMD operations must include a global information network accessible to all units and activities participating in TMD operations. This network must be accessible from strategic locations in CONUS, through the theater of operations, to the operational and tactical headquarters. It must link deployed units and activities with national, joint and multinational command nodes, permit a rapid exchange of critical information allowing commanders and battle staffs at each echelon to form a common picture of the battlefield. Communication and automation capabilities must comply with the Army Technical Architecture (ATA). Specific communication capabilities must include:

- Use of broadcast communication systems to provide intelligence, TM warning information and NBC hazard warning information to all recipients simultaneously, or selectively by sensor-to-soldier links.
- Reliable, jam-resistant, high capacity, long distance, over-the-horizon communication systems to include aerial, satellite or surrogate satellite capabilities.
- Prioritized satellite assets to provide capability for SOF, early warning and other TMD feeder operations.
- Use of high capacity, distributed joint data surveillance network(s) capable of detecting and identifying threat targets and rapidly distributing TM track data to all units participating in TMD.
- Interoperable national/joint/multinational systems for data and voice communications.



(3) Computers enhance performance of C3 as part of BM/C4I.

(a) All TOCs employed in TMD operations must have user friendly automation capabilities. These include the capability (as appropriate) to:

- Interoperate with national, joint and multinational systems.
- Conduct joint automated airspace management.
- Effectively perform force operations and engagement operations.
- Employ embedded, interactive simulations/ applications for training of operators.

(b) All other TMD systems (e.g., sensors, processors and weapon systems) must also have user friendly automation capabilities to enable:

- Efficient and user friendly operator interface with the system for purposes of control and monitoring the systems, with user tailorable decision aids.
- Seamless interface with other adjacent, supporting and supported systems as required.
- Sharing of common data among systems for the conduct of operations.
- Employ embedded, interactive simulations/ applications for training of operators.

(4) Intelligence. Intelligence capabilities required to support TMD operations must include an integrated suite of advanced sensors and processors (space-based, aerial and surface) capable of rapidly collecting, integrating and fusing intelligence information for use by commanders at all echelons. Intelligence databases must be capable of being updated in near real time, and must be readily accessible to users and tailorable to their needs.

(a) Intelligence architecture must enable commanders to:

- Locate, identify and track threat TMs and their components throughout the threat life cycle, including pre-launch location and tracking of warheads, propulsion and guidance components.
- Accurately detect, locate, track, discriminate and, as required, identify components of the TM infrastructure, with a location accuracy sufficient to support the targeting capabilities of all deep attack weapon systems.
- Provide reliable and timely TM launch detection, target recognition, full trajectory tracking and impact point prediction information.
- Provide quick and accurate targeting information of deployed and in-flight TM weapons, via automated sensor-to-shooter interfaces, directly to units conducting attack operations and active defense.

- Accurately predict TEL deployment routes, movement speeds and likely hide and reload sites.
- Provide information at multiple levels of security.
- Automatically sanitize information, when appropriate, to facilitate the planning and execution of TMD operations.
- Provide accurate, detailed and timely weather information (current and predicted).
- Provide accurate, detailed and timely terrain information.

(b) SOF capabilities must include advanced target acquisition sensors to support attack operations targeting. These sensors include enhanced digital video cameras, improved thermal night sights, and special acoustic sensing devices. The cameras equipped with the thermal night sights must be capable of transmitting digital imagery in near real time to the Joint Special Operations Task Force (JSOTF) or Special Operations Command (SOC) to provide intelligence information that can be used to support targeting decisions. The acoustic devices must provide information on enemy movements and activities that can also be used to support targeting decisions.

b. Attack Operations uses firepower to protect forces by destroying the elements of the TM threat. Flexible targeting and massing of fires (not units) provides reactive maneuver support via quick counterfire or interdiction. With support of BM/C4I, units and weapon systems conducting attack operations must quickly detect, classify and identify TM targets, ensure proper combat ID, track moving targets, execute targeting operations and employ attack assets to eliminate enemy targets within required timelines.

(1) Unit capabilities. Friendly tactical cruise missiles should fly to a target area of interest, loiter for an extended period of time, scan the area with advanced sensors to detect TM targets, and disperse brilliant munitions to selectively attack TM targets. Aviation capabilities must be enhanced to include stealth helicopters capable of performing multiple, simultaneous, deep strike missions over wide areas and extended ranges, using improved munitions. Brilliant munitions must discriminate real targets from decoys, coordinate their attack, and provide intelligence updates and BDA in near real time. Improved munitions must include long-range precision guided missiles or lethal UAVs capable of destroying enemy TMs and infrastructure, thereby extending the effective deep strike capability and enhancing survivability.

(2) Counter-reconnaissance. All commanders must conduct TM counter-reconnaissance actions to reduce the enemy's TM targeting capabilities. Complete defense of friendly areas from ISR assets is not possible, therefore IPB must identify ISR staging and launching areas as targets for preemptive attacks. Areas of friendly concentration or other critical points should be designated for increased active and passive defense and

ISR risk accepted in other non-critical areas. A combined arms approach should emphasize use of all organic weapons to counter UAVs or fixed-wing/helicopter aircraft reconnaissance.

c. Active defense is a fundamental application of protective firepower and enables other enduring functions; maneuver by preventing the TM threat from canalizing or denying parts of the battlefield; logistics by protecting ports, nodes and critical assets. Active defense weapon systems must provide a near leak proof defense of the force and selected assets during all stages of force projection operations. This includes protecting theater sustainment areas and geopolitical assets as well as the corps and divisions.

(1) A mix of complementary active defense systems must be employed to effectively counter the TM threat during early entry and follow-on operations. This mix will consist of an upper tier system and one or more lower tier systems. The upper tier system must counter the longer range TBMs that are beyond the engagement capabilities of the lower tier systems. The lower tier systems primarily counter the TBMs, CMs, TASM's, and aerial ISR and CM launch platforms that cannot be effectively engaged by the upper tier system. The upper tier system must employ advanced interceptors to neutralize TBMs armed with WMD warheads. Intercepts must occur at long ranges and high altitudes (some exoatmospheric) to allow multiple engagement opportunities and to ensure that collateral damage is minimized. Active defense systems must be capable of receiving or predicting impact points and cueing hazard prediction and warning systems. Both upper and lower tier systems must be capable of accurately classifying TBMs so that fires can be optimized against the incoming targets. So that interceptor assets will not be wasted, they must also be capable of discriminating TBMs and re-entry vehicles from spurious targets (decoys, chaff or missile debris) and from self screening jammer/escort support jammer (SSJ/ESJ) electronic countermeasures. They must also have sufficient firepower to engage large numbers of simultaneously arriving TBMs and must be capable of coordinating fires to ensure that engagements are optimized.

(2) Lower tier systems must have sufficient mobility and tactical deployability to be capable of protecting maneuver forces and assets in the corps and division areas from short range TBMs, CMs and TASM's; as well as countering the aerial ISR and CM launch platforms.

(3) All active defense integrated networks must provide for rapid combat ID capability to maximize early and multiple engagements of TBMs in the air or before launch.

d. Passive defense. Passive defense systems capabilities and actions extend the battlespace response time and geometry (dimensions). This is a key enabler which permits seizing and retaining the initiative in maneuver despite TM effects, and facilitates protective measures and the restoration of combat power.

(1) Counter-proliferation (CP) support is a TMD passive defense action in that successful prevention of an enemy's access to TBMs prevents their use. Operational level commanders support of national CP missions requires flexible response and enhanced information operations, as potential actions are to support military blockades, covert operations or treaty verification. The ARFOR commander will need quicker responsiveness and enhanced situational awareness from national/strategic assets, especially during the early entry phase when US force vulnerability is high and enemy intentions are unclear. Destruction of TBMs or infrastructure may be a required action to accomplish the CP mission. Combat capabilities that support the this mission include enhanced intelligence data fusion, long range, stand-off remote detection, scatterable detectors, non-destructive facility denial systems, enhanced modeling and effects prediction models.

(2) Conduct deterrence. Deterrence requires combat ready forces and a demonstrated resolve to employ them that will convince a threat that use of TBMs would be unsuccessful and counterproductive. Deterrence requires effective training and use of sensor systems to provide force warning and monitoring during non-hostile periods. Other deterrence options include overt demonstrations of ARFOR capabilities and resolve to contend with a TM threat. Deterrence requires the force to train and equip itself to operate under a TM threat, especially when the threat of WMD exists. Defensive readiness alone will not diminish an asymmetric threat from a state, non-state or transnational group. The ARFOR commander must have the capability to assess the threat's feasibility and prepare to conduct preemptive strikes and retaliatory strikes to destroy an enemy's missiles and supporting infrastructure.

(3) Force warning. The capability is required to selectively warn the force in time for affected soldiers to respond while minimizing the occurrence of false alarms and operational degradation. This requires two separate but related capabilities.

(a) TM hazard prediction. An automated hazard prediction tool and warning management network is required to mitigate TM effects on force OPTEMPO, survival and sustainment. The ability is needed to sort through all sources of battlefield information, integrate relevant information into a 'continuous-run' TM hazard prediction model, and provide in-time TM countermeasure options and warning. The commander must have information on friendly locations and vulnerability assessments, the enemy TM situation, ongoing TM situational awareness, NBC contamination avoidance areas and warning status. All commanders must have an improved information fusion capability to minimize TM effects and maintain combat power.

(b) Commanders at all levels must have the capability to monitor NBC hazards and TM attack warnings tailored to their level and area of interest. This warning must be rapid, provide real time friendly locations via global positioning, incorporate standoff

reconnaissance sensors and expert analysis tools, show real time launch-to-impact missile event pictures, deliver hazard prediction from networked cooperative detection arrays, cue specialized NBC and medical assets, and provide non-hierarchical warning to affected forces. Extending reaction time is the critical element of warning so an automated TMD warning system is required to minimize casualties, battlefield confusion and OPTEMPO degradation and to maximize combat power.

(4) TMD contingency planning. TMD contingency planning must occur from theater-strategic down to tactical levels and support the JFC's campaign plan. Improved intelligence fusion and vulnerability assessment models must be implemented to enhance the identification and prioritization of assets. TMD wargaming requires training exercises and simulations that will test a TMD plan's adequacy, preferably down to tactical levels.

(5) Mobility. TMD requires an improved mobility to ensure that the force is never in one place long enough to become a lucrative target. Improvements in battle command and battlespace management improve mobility. Units require enhancements that will enable them to mass fires rather than forces. Improved mobility is required of C2 nodes and tactical logistics sites. Split based operations and 'pushed, just-in-time' logistics greatly aid this effort.

(6) Information operations. Commanders must be able to implement measures that deny information on friendly force locations to increase the enemy's TM targeting error. This required capability is especially critical to countering the effectiveness of precision-guided missiles. Staffs, using expert decision support tools, must have the capability to track the enemy's TM forces and recommend traditional and innovative measures in OPSEC, deception, mobility, electronic protection, and counter-reconnaissance. A concealed force is achieved by using a digitized battle command system and by conducting information operations with advanced sensor arrays and the battlespace expansion characteristic of Army XXI operations.

(a) OPSEC. OPSEC must be linked to improved information operations that dissect enemy TM operations and provide optimal countermeasures. OPSEC in TMD requires improvements in communications security, signature reduction, and physical security measures.

(b) Deception. Effective deception requires the capability to cause an enemy to deplete its TM resources by attacking false targets (decoys), missing intended targets, and by denying the enemy accurate BDA. Deception will also be effective if it affects the adversary's operational timing by fixing or slowing his forces and causing them to miss attack opportunities.

(c) Electronic protection. Commanders require effective electronic protection measures, either passive or non-lethal attack, capable of disrupting the enemy's

target acquisition and target engagement process through jamming and spoofing. This may include electronic spectrum supremacy through non-nuclear electromagnetic pulse generators, space-based information denial systems, and computer viruses. Improved force design should ensure that all critical electronic equipment needed for the battle is either electromagnetic pulse (EMP) hardened or has spare items provided.

(7) Enhanced personnel and equipment survivability. Survivability enhancements require advancements in equipment hardening, redundancy and robustness, better interface with civilian defense authorities, and better NBC protection. In addition, staffs will need improved information operations tools that project logistical needs and recovery/reconstitution requirements to enable them to assess force protection before and during operations. Force protection in this context is more than security, deception, health and the other issues defined in FM 101-5-1. Staffs must assess the aggregate of all active and passive measures taken to preserve the force during all operations and environments.

(a) Improved force protection, primarily WMD protection, is essential to overall force survivability and tempo preservation. Key required capabilities to TMD force protection are: (1) networked NBC detector arrays, (2) a TMD vulnerability assessment model-embedded in the TMD hazard prediction and warning network, (3) low degradation individual mission oriented protective posture (MOPP) gear and collective protection, and (4) improved capability to detect NBC industrial capability for subsequent interdiction. While these capabilities are required for forces to be effective, they will be fielded as part of the general capabilities of Army forces as a whole.

(b) Improved medical pretreatment measures, including specific biological agent immunizations, must be implemented to reduce the susceptibility of soldiers to NBC agents and to improve treatment responsiveness.

(c) Improved decontamination systems must be employed to quickly decontaminate equipment and personnel and restore the tempo of operations. Coupled with less vulnerable equipment, these systems must be more effective, easier to use and require less logistical support than current systems.

(8) Recovery and reconstitution planning. Commanders must have the capability to develop plans for the recovery and reconstitution of elements following a TM attack. This plan will focus on the mass casualty potential of TMs with NBC payloads. The plan must establish recovery operations to reestablish communications, conduct NBC decontamination, replace personnel and equipment, treat casualties, and conduct remedial training. The planning process must also address reconstitution. Staffs must have the capability to plan the conduct of large-scale casualty evacuation and unit reconstitution. Reconstitution planning requires consideration of regeneration of people and equipment, reorganization of units and the training of

those forces. Commanders require improvements in information operations to better anticipate and respond quickly with greater accuracy to a mass casualty situation. A special TMD staff may need to track reconstitution during early entry operations and may need to provide 'ad-hoc' reconstitution assessment teams until the appropriate headquarters arrive.

### 3-4. Future Operational Capabilities (FOC).

No new FOCs are currently envisioned. Those documented in TRADOC Pam 525-66 (May 1997 version) were previously revised to incorporate the requirements of this warfighting concept of operations. The applicable TRADOC integrated FOCs and the primary capability statements that support this concept are listed below, along with supporting FOCs (if any) from the TMD operational element proponent centers. Other FOCs that will be implemented across the Army XXI force (e.g. EN 97-012, Force Protection) are not specifically listed; they are considered as 'general support' measures.

a. TR 97-001 Command and Control. Capability to link all battlespace elements from the individual soldier through the national command authority in real time. Capability to electronically partition data and hand-off relevant data to the appropriate user. Capability to continuously plan, communicate intent, issue orders, monitor and coordinate operations including joint and coalition operations. Capability must support battle command functions wherever the commander is located. Supporting FOCs: AD 97-004; BCL 97-008; BCL 98-002, CM 97-001, CM 97-004, CM 97-008; DSA 97-007, DSA 97-016, DSA 97-017, DSA 97-022, DSA 97-025, DSA 97-027; FA 97-006, FA 97-009, FA 97-010, FA 97-013, FA 97-015, FA 97-024, FA 97-035, FA 97-036; MI/BCH 97-008, SP 97-001, SP 97-002, SP 97-004, SP 97-006, SP 97-007, SP 97-009, SP 97-011, SP 97-014, SP 97-015, SP 97-016, SP 97-017, SP 97-019, SP 97-020.

b. TR 97-002 Situational Awareness. Capability to create an accurate and high fidelity, all weather, common collaborative real time picture of the battlespace to include weather, terrain, environment, and friendly/enemy/neutral/non-combatant situational and status information. The common picture must be continuous and selectable from the common air, stationary, or on the move ground platforms, air defense, naval, space, and wargaming sources depending on the needs of the viewer. Supporting FOCs: AD 97-004; BCL 98-001; BCL 98-002; CM 97-001, CM 97-002, CM 97-008, DSA 97-004, DSA 97-005, DSA 97-006, DSA 97-007, DSA 97-008, DSA 97-009, DSA 97-010, DSA 97-011, DSA 97-012, DSA 97-013, DSA 97-014, DSA 97-015, DSA 97-016, DSA 97-020, DSA 97-021, DSA 97-022, DSA 97-025; FA 97-005, FA 97-006, FA 97-007, FA 97-009, FA 97-010, FA 97-013, FA 97-020, FA 97-022, FA 97-023, FA 97-024, FA 97-035, FA 97-036; SF 98-003; SF 98-113; SP 97-001, SP 97-002, SP 97-004, SP 97-006, SP 97-007, SP 97-009, SP 97-011, SP 97-012, SP 97-015, SP 97-016, SP 97-017, SP 97-020.

c. TR 97-003 Mission Planning and Rehearsal. Capability of the warfighter to conduct rapid mission planning, preparation, and execution. Decision-making

and operations planning requires knowledge-based capabilities and decision aids, to improve quality and reduce decision making time. Decision-making must take advantage of real time information available on seamless information networks to plan and rehearse operations. Supporting FOCs: AD 97-005; BCL 97-019; BCL 98-001, BCL 98-003, BCL 98-005, CM 97-001, CM 97-008; DSA 97-001, DSA 97-002, DSA 97-007, DSA 97-013, DSA 97-014, DSA 97-022, DSA 97-027; FA 97-007, FA 97-008, FA 97-009, FA 97-015, FA 97-023, FA 97-035, FA 97-036; MI/BCH 97-001, MI/BCH 97-002; SP 97-001, SP 97-002, SP 97-004, SP 97-005, SP 97-007, SP 97-011, SP 97-014, SP 97-015, SP 97-016, SP 97-017, SP 97-020.

d. TR 97-004 Tactical Operation Center (TOC) Command Post (CP). Must support simultaneous operation of diverse information systems and be quickly re-configurable to support various combinations of automated systems and staff functions, to include mission planning, rehearsal, and execution, ensuring maximized signature reduction. Facilitates real time, robust, long range, seamless connectivity to all space, air, ground, surface and submersible information systems and sub systems as applicable to mission requirements. Provides commander and staff with the ability to perform command and control from remote sites. Supporting FOCs: AD 97-006; BCL 98-003, CM 97-001; CM 97-004, CM 97-008; DSA 97-015, DSA 97-019, DSA 97-027; FA 97-009, FA 97-012, FA 97-014, FA 97-022, FA 97-025, FA 97-036; MI/BCH 97-008 MI/BCH 97-009 MI/BCH 97-010, MI/BCH 97-011; SC/BCG 97-001, SC/BCG 97-006; SP 97-001, SP 97-002, SP 97-005, SP 97-009, SP 97-011, SP 97-014, SP 97-015, SP 97-016, SP 97-017, SP 97-018, SP 97-020.

e. TR 97-005 Airspace Management. This requires close integration between command and control, Army airspace command and control, Army aviation, air defense, artillery, military intelligence, aero-medical support, special operations, airborne and infantry operations, mounted ground operations, sister service and coalition members operations, and possibly civilian airspace management agencies. Also requires communication and automation capability that is compatible with these organizations and that is compliant with the Army Battle Command System and Common Operating Environment equipment and with required standards. Data communication must interface with and facilitate sensor to shooter linkage systems for AD and FA platforms. Supporting FOCs: AD 97-004, AD 97-006; DSA 97-003, DSA 97-015, DSA 97-025; FA 97-009, FA 97-012, FA 97-020, SP 97-001, SP 97-005, SP 97-007, SP 97-016.

f. TR 97-006 Combat Identification. Capability to detect, discriminate, identify through active, non-cooperative methods, and prioritize both ground and aerial platforms at ranges in excess of the threat's detection and weapon systems effective ranges and inside the threat's detection and response time. The capability must be effective day or night in adverse weather, in cluttered background environments, and in the presence of threat countermeasures. The capability

must provide real time, accurate target location information. Supporting FOCs: AD 97-006; DSA 97-005, DSA 97-010, DSA 97-011, DSA 97-021, DSA 97-024, DSA 97-025, DSA 97-028; FA 97-004, FA 97-013; MI/BCH 97-003, MI/BCH 97-004, MI/BCH 97-005, MI/BCH 97-006; SF 98-027; SP 97-001, SP 97-002, SP 97-009, SP 97-011, SP 97-014, SP 97-015, SP 97-016, SP 97-017, SP 97-020.

g. TR 97-007 Battlefield Information Passage. This architecture will provide a capability for total, uninterrupted, interoperable data networking of secure and non-secure data; voice, imagery, and video transfer in real time, near-real time, and non-real time between government, non-government, and military health services systems assets agencies; combined arms; tactical and strategic forces; and joint, combined, and coalition forces throughout the battlespace from the National Command Authority to operator level. Supporting FOCs: AD 97-004, AD 97-006, AD 97-011; BCL 98-001, BCL 98-002, CM 97-001, CM 97-002, CM 97-008, DSA 97-07, DSA 97-008, DSA 97-012, DSA 97-014, DSA 97-016, DSA 97-017, DSA 97-021, DSA 97-025; FA 97-005, FA 97-006, FA 97-007, FA 97-008, FA 97-009, FA 97-010, FA 97-011, FA 97-012, FA 97-013, FA 97-015, FA 97-019, FA 97-021, FA 97-022, FA 97-023, FA 97-024, FA 97-025, FA 97-030, FA 97-035, FA 97-036; MI/BCH 97-008; SC/BCG 97-001, SC/BCG 97-002, SC/BCG 97-004, SC/BCG 97-006, SC/BCG 97-007, SF 98-113; SP 97-001.

h. TR 97-011 Information Services. Capability for seamless global information services that include data warehousing, video teleconferencing, multilevel security, and seamless messaging. Capability to verify data integrity, verify/authenticate the originator of a transaction, provide proof of participation of both sender and receiver of a transaction, ensure the availability of services to authorized users, and provide an optional data encryption capability. Supporting FOCs: CM 97-001, CM 97-002, CM 97-008, DSA 97-007, DSA 97-008, DSA 97-012, DSA 97-014; FA 97-005, FA 97-022, FA 97-023, FA 97-024, FA 97-036; MI/BCH 97-007, MI/BCH 98-008; SC/BCG 98-001; SP 97-006, SP 97-008, SP 97-009.

i. TR 97-012 Information Systems. Capability to supply the warfighter with key decision making information in a time sensitive manner, real or near real time. This capability involves acquiring, integrating, and synchronizing information from vertical and horizontal command and control systems; sensor systems; and battlefield functional area systems. This encompasses strategic, operational, tactical, and joint operations. The resulting 'system of systems' provides the warfighter with a force multiplier in battle command, common picture, target acquisition, lethality/survivability, logistics, operations planning, and joint interoperability. Supporting FOCs: AD 97-004, AD 97-011; BCL 98-001, BCL 98-002, CM 97-001, CM 97-002, CM 97-008, DSA 97-007, DSA 97-008, DSA 97-012, DSA 97-014, DSA 97-016, DSA 97-017, DSA 97-021, DSA 97-025; FA 97-005, FA 97-022, FA 97-023, FA 97-024, FA 97-036; MI/BCH 97-008; SP 97-001, SP 97-002, SP 97-005, SP 97-006, SP 97-007, SP 97-008, SP 97-009, SP 97-011, SP 97-012, SP 97-014, SP 97-015, SP 97-016, SP 97-017.

j. TR 97-018 Relevant Information and Intelligence. Establish linked processes to collect, process, and provide critical information and intelligence, that supports battlefield visualization, decision-making and information operations - both offensive and defensive. Identify commander's critical information and priority intelligence requirements (CCIR/PIR) to support decisions. Supporting FOCs: AD 97-004, BCL 98-002; BCL 98-003, CM 97-001, CM 97-008; DSA 97-007, DSA 97-008, DSA 97-012, DSA 97-016, DSA 97-022, DSA 97-025; EN 97-008, EN 97-007, FA 97-006, FA 97-007, FA 97-010, FA 97-013, FA 97-022, FA 97-023, FA 97-035, FA 97-036, MI/BCH 97-002, MI/BCH 97-004; SC/BCG 98-008; SF 98-003; SF 98-113.

k. TR 97-019 Information Protection. Information protection requires the capability to reduce the adversary's ability to attack friendly information systems and reduce friendly vulnerability to counter information gathering operations. Supporting FOCs: AD 97-006, AD 97-008; CM 97-007; DSA 97-030; FA 97-027; MD 97-002; MI/BCH 97-003 MI/BCH 97-004, MI/BCH 97-005, MI/BCH 97-006, MI/BCH 97-011, MI/BCH 97-013; SC/BCG 98-008; SP 97-001, SP 97-004, SP 97-007, SP 97-009, SP 97-012, SP 97-014, SP 97-015, SP 97-016, SP 97-017, SP 97-018, SP 97-020.

l. TR 97-021 Real Time Target Acquisition, Identification and Dissemination. The Army requires the capability to:

- Conduct continuous, responsive, pro-active, real time ground, air and space-based target acquisition from a moving or stationary platform.
- Detect, locate, track, identify and classify active and passive targets in all weather, all terrain and all environments at extended ranges throughout the extended, 360 degree, 3-dimensional battlespace.
- Defeat emerging threat protective systems.
- Precisely conduct automatic target recognition, battle damage assessment, and moving target indication with zero target location error.
- Disseminate targeting information throughout the force with a netted, distributed, non-dedicated, integrated, seamless communications network.

Supporting FOCs: AD 97-006; DSA 97-009, DSA 97-010, DSA 97-011, DSA 97-014, DSA 97-016, DSA 97-017, DSA 97-021, DSA 97-025, DSA 97-028, DSA 97-030; FA 97-001, FA 97-002, FA 97-007, FA 97-008, FA 97-013, FA 97-020, FA 97-022, FA 97-024, FA 97-035, FA 97-036; SF 98-027; SF 98-503; SF 98-504.

m. TR 97-026 Deployability. Capability to rapidly deploy, employ, and re-deploy while keeping pace with future technological advances in air, land, sea, and space delivery capabilities in support of strategic operational and tactical power projection and pre-positioned operations. Supporting FOCs: AD 97-001; BCL 98-001; CM 97-012; DSA 97-018; FA 97-014, FA 97-021, SP 97-001, SP 97-002, SP 97-007, SP 97-009, SP 97-011, SP 97-012, SP 97-014, SP 97-015, SP 97-016, SP 97-017, SP 97-019, SP 97-020.

n. TR 97-027 Navigation. Forces require navigation capabilities that produce automated and on demand, real time, on-board, all weather position location that locates terrain features and elements of friendly units, while they are stationary and on the move. Supporting FOCs: AD 97-004; CM 97-014; DSA 97-006; FA 97-005, FA 97-012; SP 97-001, SP 97-002, SP 97-006, SP 97-007, SP 97-009, SP 97-012, SP 97-014, SP 97-017.

o. TR 97-040 Firepower Lethality. Capability to provide responsive overmatching lethal combat power against current and future threats throughout the battlespace. Capability should be impervious to countermeasures and all environmental conditions to include battlefield clutter. Capability should include overmatching range, probability of hit and kill accuracy, which minimize resources expended, maximizing effects, and minimizing collateral damage. Supporting FOCs: AD 97-003, AD 97-009, AD 97-012; DSA 97-001, DSA 97-002, DSA 97-003, DSA 97-014, DSA 97-023, DSA 97-024, DSA 97-026, DSA 97-028; FA 97-001, FA 97-002, FA 97-017, FA 97-020, FA 97-021; MI/BCH 97-011; SF 98-504; SP 97-001, SP 97-002, SP 97-006, SP 97-007, SP 97-009, SP 97-011, SP 97-012, SP 97-014, SP 97-015, SP 97-016, SP 97-020.

p. TR 97-043 Survivability - Materiel/Facilities. Capabilities are required to protect facilities, information systems, and equipment by minimizing risks associated with acts of terrorism and sabotage, sympathetic detonations of munitions, or direct and indirect fires. This includes the capability to rapidly construct and repair fortifications, protective shelter/positions, and forward operating bases. Capabilities will also be required to survive through the use of active and passive defense. Supporting FOCs: AD 97-008, AD 97-009; CM 97-004, CM 97-007; DSA 97-003, DSA 97-004, DSA 97-028, DSA 97-030; FA 97-003, FA 97-004, FA 97-011, FA 97-034; MI/BCH 97-003, MI/BCH 97-004, MI/BCH 97-005, MI/BCH 97-006, MI/BCH 97-007, MI/BCH 97-010, MI/BCH 97-013; SP 97-001, SP 97-002, SP 97-003, SP 97-004, SP 97-005, SP 97-006, SP 97-007, SP 97-008, SP 97-009, SP 97-012, SP 97-014, SP 97-015, SP 97-016, SP 97-017, SP 97-019, SP 97-020.

q. TR 97-047 Leader and Commander Training. Capability to train leaders and commanders to be versatile and adaptive to varied mission requirements in a technologically advanced, information-rich, operationally diverse, and fast paced battle staff environment. Trainers must fully understand the impacts of this environment on leaders and commanders. Train leaders and commanders to make optimal use of battle staffs as problem solving resources through improved teamwork and collaboration. Train leaders and commanders to comprehend the organization, structure, capabilities, and limitations of current and future C4I architectures. Supporting FOCs: BCL 97-005, DSA 97-029; MI/BCH 97-015; SP 97-005, SP 97-018.

r. TR 97-053 Embedded Training (ET) and Soldier-Machine Interface. Capability to design training systems into or add training systems to operational

systems to enable soldiers to train using organic equipment while in the field or at home station. The objective embedded training system(s) will provide the cues necessary to train individual and collective skills; allow the system to participate in force-on-force exercises through embedded tactical engagement simulation and instrumentation; and interoperate with Army Battle Command System (ABCS) platforms and combat training centers' instrumentation systems. Supporting FOCs: AD 97-005; CM 97-001; CM 97-008; FA 97-015; SP 97-005; SP 97-018; SP 97-020.

## Chapter 4 Implications

**4-1. Doctrine.** New doctrine must be IAW Joint Publications 3-01 and 3-01.5, which advocates eliminating most of the threat before they can attack U.S. forces. For attack operations, the focus may be to assess the political, legal and technological environments, proactively search for, then attack, the threat's TM infrastructure, capitalizing on all opportunities to destroy production, storage and distribution facilities, logistic support facilities, ISR systems, C2 nodes and launchers. The focus of active defense operations should be to engage and achieve boost-phase intercept at extended ranges, employing a complementary mix of weapon systems and flexible firing doctrine to achieve near leak-proof defenses. The focus of passive defense operations should be to provide hardening against attack and to provide early warning to affected forces and population centers to minimize the effects of TM attack. BM/C4I should be configured and planned to achieve maximum joint intercommunication of data, minimum transmission time from sensor to shooter and optimum C2 of the TMD effort.

**4-2. Training.** This concept will significantly impact the way training is conducted in the Total Force. The short deployment timelines for Army forces require a high degree of readiness and fully trained, combat readiness. Interactive training simulators must be built into systems, and the systems networked across all battle functions, to facilitate total force/soldier training. This will enable soldiers to conduct stand-alone TMD operations training (individually or in crews) by using actual system hardware and software under realistically simulated battlefield conditions. Embedded capabilities will allow commanders to assess the performance of individual soldiers, crews and units, and quickly identify and resolve training shortcomings. The capability to internet systems and integrate their interactive training capabilities enables units and soldiers to exercise essential TMD planning and execution activities in a fully integrated virtual battlefield environment. This capability will also facilitate training with other units and Services and demands the support of remote simulations and long-distance communications. Training using pre-recorded battle scenarios based on expected enemy COAs will enable soldiers, crews and units to train to the anticipated threat. These advanced

training capabilities along with live joint exercises, command post exercises and field training exercises facilitates the seamless integration of today's training, and enables soldiers to train exactly as they will fight on the joint battlefield.

**4-3. Leader development.** The Army must develop leaders for all branches, components and levels who understand TMD operations and can function effectively on the Army XXI battlefield. In addition to the training implications for leaders, they must also possess greater knowledge and technical insight on the capabilities and limitations of Army and joint systems employed in TMD, a better understanding of Army and joint doctrine and organizations and how to integrate and employ systems on the battlefield. How to tailor forces and organizations to counter threats the enemy is likely to employ in war support and sustainment operations is also required. Leaders must understand the C3 implications of Army XXI battlefield environments—environments characterized by shorter engagement timelines, decentralized operations, non-hierarchical dissemination of intelligence and targeting information, expanded joint/multi-national operations and implications of the use of WMD.

**4-4. Organization.** TMD operations in the 21st century will significantly impact Army organizations. Reserve and National Guard, as well as Active units must have similar or at least compatible capabilities in order to integrate into the TMD battle.

a. The ARFOR commander requires a force level TMD coordinating unit during all stages of all operations. This organization will be capable of planning, coordinating and integrating operational elements of TMD. It will have broad-based communications capabilities that allow it to interface with other Army, joint and multinational forces, and it will provide the commander a fully integrated picture of ground, sea and air operations. During early entry, it will be capable of (1) integrating with other service and functional component commanders to provide joint C4I, (2) linking with attack operations weapon systems to control attack operations, and (3) providing necessary defense design and rules of engagement to TMD active defense forces. In both early entry and sustained operations, it will be capable of providing initial focus for passive defense efforts including predicting NBC hazards and disseminating warnings to affected forces.

b. Organizations involved in TMD operations will be more mobile and versatile to satisfy force projection requirements. They will be modular and tailorable to support contingency operations and then adapt to needed changes in task organization. Tailorability is particularly important in TMD operations because it will allow commanders to quickly adjust to changes in enemy COAs, and thus more effectively counter the TM threat through all patterns of operation.

**4-5. Materiel.** Materiel improvements and development initiatives likely will be a significant means of ensuring that the Army TMD force is capable of effectively performing the TMD mission in the 21st century. Army combat and materiel developers must support improvements and initiatives that leverage information age technologies and space-based capabilities to extend battlespace visualization, and must ensure that these technologies and capabilities are integrated into force modernization efforts. Developers must also ensure that these improvements and initiatives incorporate designs that are common and interoperable with joint service architectures. Systems must be designed to be survivable in the EMP environment and capable of withstanding C2W attacks. Reserve and National Guard units must be similarly equipped to the Active Force.

a. TMD C4I. This equipment must be designed to allow for employment of decentralized operations and direct sensor-to-shooter dissemination of targeting fire control information. Information-age processors and high data rate communication systems must be integrated with sensors, weapons and BM systems, allowing critical information to be exchanged in near real time. C2 nodes must have improved interoperability with joint and multinational forces to facilitate joint planning and execution of all operations. Sensors (surface, aerial, and/or space-based) must have improved capabilities to detect the elements of the enemy's TM infrastructure, accurately locate and identify, acquire and track those elements (especially transporter-launchers), and quickly cue weapons used to conduct attack operations and active defense systems.

b. Attack Operations weapon systems (in all operation domains) must have improved capabilities to penetrate deep into enemy territory and engage the elements of the TM infrastructure (including hardened and buried targets, ground C4ISR) at day or night, under all weather conditions, and at much longer standoff ranges and shorter timelines than are possible today. Munitions must be smarter, more accurate and more lethal.

c. Active Defense sensors must have improved capabilities to detect at very long ranges, classify and track incoming TMs, discriminate between real TMs and spurious targets and quickly cue weapons so the TMs can be effectively engaged. This includes improved positive combat identification so that TMs and aircraft TM/ISR platforms can be destroyed over enemy territory, mitigating collateral WMD effects. A complementary mix of surface, aerial and space-based sensors must be fielded to ensure that the entire theater of operations is covered (especially CM routes) and that TMs can be detected at sufficiently long ranges to ensure multiple engagement opportunities. A complementary mix of ground-based weapon systems must be fielded to provide tiered near leak-proof defense to protect forces and

critical assets throughout the battlespace. Weapon systems must have greater firepower, and must be capable of engaging larger numbers of TMs that arrive simultaneously or in the presence of technical counter-measures. Weapon systems must also have better strategic mobility and tactical deployability. Munitions must be more accurate and lethal, employing advanced technologies to ensure that biological and chemical warheads are neutralized and that collateral damage from missile debris is minimized.

d. Passive defense capabilities must ensure that timely TM launch warnings (PGIP/T) are disseminated to affected locations, and that the forces are adequately protected against NBC weapons. Platforms for detecting and identifying biological and chemical agents must be fielded that are capable of detecting the agents at long standoff ranges and disseminating the information to a TM hazard warning system, which in turn will provide hazard situation awareness and knowledge of the hazard's impact to all elements of the force. The system must be capable of providing information on current and predicted locations of TM-delivered hazards, that enable commanders to assess their potential impact on maneuver, combat support and combat service support operations.

**4-6. Soldier support issues.** TMD operations in the 21st century will significantly impact soldiers. Soldiers must be able to effectively execute operations against a wide range of threats ranging from enemy ISR platforms to TMs carrying NBC weapons. Soldiers must know the potential impacts of these threats on operations, and must be thoroughly trained in ROE, tactics, techniques and procedures of TMD. Soldiers must be provided with effective and safe biological and medicinal pre-treatments to reduce personal vulnerability to WMD. Soldiers must also be sensitized to the destructive potential of NBC weapons, and the importance of passive defense operations in the successful execution of TMD. Soldier confidence in NBC defenses must be raised through training programs and field exercises in which these threats are realistically simulated.

## **Appendix A**

### **References**

#### **Section I**

##### **Required publications**

Joint Concept for Future Operations, May 1997  
(available at <http://www.dtic.mil/jv2010/cfjoprnl.pdf>)

FM 101-5-1  
Operational Terms and Graphics

TRADOC Pamphlet 525-5  
Army XXI Operations

TRADOC Pamphlet 525-66  
Future Operational Capability

TRADOC Pamphlet 525-77  
Battlefield Distribution

TRADOC Pamphlet 525-68  
Concept for Modularity

TRADOC Pam 525-200-1  
Battle Command, U.S. Army Battle Dynamic Concept

TRADOC Pam 525-200-2  
Early Entry Lethality and Survivability, U.S. Army  
Battle Dynamic Concept

TRADOC Pam 525-200-3  
Dismounted Battlespace, U.S. Army Battle Dynamic  
Concept

TRADOC Pam 525-200-4  
Mounted Battlespace, U.S. Army Battle Dynamic  
Concept

TRADOC Pam 525-200-5  
Depth and Simultaneous Attack, U.S. Army Battle  
Dynamic Concept

TRADOC Pam 525-200-6  
Combat Service Support, U.S. Army Battle Dynamic  
Concept

TRADOC Pamphlet 525-553  
Combat Service Support

TRADOC Pamphlet 525-63 (R)  
US Army Operations Concept for Biological Defense

#### **Section II**

##### **Related publications**

Joint Pub 3.0  
Doctrine for Joint Operations

Joint Pub 3-01.5  
Doctrine for Joint Theater Missile Defense

Joint Pub 3-03  
Doctrine for Joint Interdiction Operations

Joint Pub 3-09  
Doctrine for Joint Fire Support

Joint Pub 3-11  
Joint Doctrine for Nuclear, Biological and Chemical  
(NBC) Defense

Joint Pub 3-13  
Joint Doctrine for Information Operations

Joint Pub 3-13.1  
Joint Doctrine for Command and Control Warfare (C2W)

Joint Pub 3-54  
Joint Doctrine for Operations Security

FM 100-5  
Operations

FM 44-100  
US Army Air Defense Operations



US Army Battle Command Tactics, Techniques and Procedures Handbook (<http://cacfs.army.mil/index1.htm>)

US Army Air and Missile Defense Master Plan (available at <http://147.71.210.21/amd/>)

US Army Modernization Plan, 1998  
(This publication may be obtained from HQDA, ODCSOPS-FD, Washington DC 20310.)

Special Operations Command and Control Element (SOCCE) Handbook, 1 Feb 94  
(This publication may be obtained from Commandant, USAJFKSWC  
ATTN: AOJK-DT-JA  
Fort Bragg, NC 28310.)

## Glossary

### Section I Abbreviations

AAMDC	Army Air and Missile Defense Command	EAC	echelons above corps
ABCS	Army Battle Command System	ECAC	enhanced counter-air capability
ABT	air breathing threat	EMP	electromagnetic pulse
AFATDS	Army Field Artillery Tactical Data System	ESJ	escort support jammer
AO	area of operations	FOC	Future Operational Capability
AOR	area of responsibility	HN	host nation
ARFOR	US Army forces	HUMINT	human intelligence
ATA	Army Technical Architecture	IMINT	imagery intelligence
AV	Army Vision	ID	identification
BDA	battle damage assessment	IO	information operations
BCD	battlefield coordination detachment	IPB	Intelligence Preparation of the Battlespace
BM/C4I	battle management/command, control, communications, computers and intelligence	ISR	intelligence, surveillance and reconnaissance
C2	command and control	JFLCC	joint force land component commander
C2W	command and control warfare	JFC	joint force commander
C3	command, control and communications	JSOTF	Joint Special Operations Task Force
C4	command, control, communications and computers	JTF	joint task force
C4ISR	command, control, communications and computers, intelligence, surveillance and reconnaissance	JTMD	Joint Theater Missile Defense
CINC	commander-in-chief	MASINT	measurement and signature intelligence
CM	cruise missile	METT-TC	mission, enemy, terrain, troops, time and civilian
COA	course of action	MOPP	mission oriented protective posture
CONUS	continental United States	NBC	nuclear, biological and chemical
CP	counter-proliferation	NGO	non-government organization
CS	combat support	OCA	offensive counter-air
CSS	combat service support	OPLAN	operations plan
CTOC	corps tactical operations center	OPSEC	operations security
DCA	defensive counter-air	OPTEMPO	operating tempo
DOC	desired operational capability	PGIP/T	predicted ground impact point/time
DOCC	deep operations coordination center	SHORAD	short-ranged air defense
DTLOMS	doctrine, training, leader development, organizations, materiel and soldiers	SIGINT	signal intelligence
		SOC	Special Operations Command
		SMDC	Space and Missile Defense Command
		SOF	special operations forces
		SSJ	self screening jammer
		TAADE	Theater Army Air Defense Element
		TASM	tactical air-to-surface missile
		TBM	tactical ballistic missile
		TECHINT	technical intelligence
		TEL	transporter-erector launcher
		TM	theater missile
		TMD	theater missile defense
		TOC	tactical operations center
		TP	TRADOC pamphlet
		TPFDL	time-phased force deployment list
		TRADOC	US Army Training and Doctrine Command
		TST	time sensitive targets
		UAV	unmanned aerial vehicle
		WMD	weapons of mass destruction

## Section II Terms

### **automated coordination cell**

In the context of TMD, a collocated, LAN based grouping of all the varied C2 and planning systems that are used in the four elements of TMD. The cell's purpose is to speed up and ensure the interchange of information between the different elements and systems to ensure all functions of TMD are effectively accomplished. A version of an automated coordination cell has already been fielded in the Theater Army Air Defense Element (TAADE).

### **battle management**

In TMD, is the conduct of tactical and operational decision making as part of the real time engagement control and timing of sensor and weapons taskings, based upon the automated combination or fusion of data from different sensors, and the application of ROE and C2 directives and restrictions.

### **defensive counter-air**

Air operations, generally reactive to enemy initiative, conducted near or over friendly territory, to attain and maintain a desired degree of air superiority by the destruction or neutralization of enemy forces. Also referred to as DCA.

### **deterrence**

The prevention of action for fear of consequences. It is a state of mind brought about by the existence of a credible threat of unacceptable counteraction.

### **endoatmospheric**

Below the sensible atmosphere (below 120 kilometers), where atmospheric interaction is of concern. See lower tier.

### **exoatmospheric**

Above the sensible atmosphere (above 120 kilometers), where atmospheric interaction is minimal. See upper tier.

### **lower tier**

Referring to defensive missile systems, generally used to defend against short and medium ranged theater missiles, and normally providing asset defense against those missiles.

### **offensive counter-air**

Air operations, generally conducted at the initiative of friendly forces, ranging throughout enemy territory, to attain and maintain a desired degree of air superiority by the destruction or neutralization of enemy forces.

### **operating tempo**

The speed or rate at which a force plans, rehearses, conducts and recovers from a military operation or in between a series of operations.

### **sensor-to-shooter**

A direct linkage from space of battlespace data of interest to the targeteer or weapons platform. In every case sensor raw data must go through some processor before it has value to the C2, shooter or intelligence node, and all firing information must go through a fire control means before it goes to the launcher/gun.

### **time sensitive targets**

Those targets requiring immediate response because they pose (or will soon pose) a clear and present danger to friendly forces or are highly lucrative, fleeting targets of opportunity.

### **upper tier**

Referring to defensive missile systems, generally those used to provide area defense against up to medium ranged missiles.

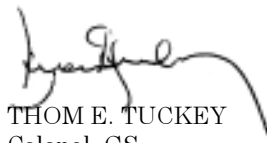
### **weapons of mass destruction**

Weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy large numbers of people. Can be nuclear, chemical, or biological or radiological weapons, but excludes the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon.

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